

TRAINING DOCUMENT

FOR

THRU-SIGHT VIDEO (TSV) SYSTEM

OPERATION

WITH

TANK WEAPON GUNNERY SIMULATION SYSTEM (TWGSS)

OR

PRECISION GUNNERY SYSTEM (PGS)

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HEADQUARTERS, DEPARTMENT OF THE ARMY

September 1998

FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.**WARNING****(M1/M1A1 and M1A2)**

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

WARNING**(M1/M1A1 and M1A2)
(System Startup)**

Ensure that ALL cables between Tank Weapon Gunnery Simulation System (TWGSS) are properly connected before turning on vehicle master power switch. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.

WARNING**(M1/M1A1)**

If a fire control malfunction is indicated on the commander's control panel or in the gunner's primary sight (GPS), IMMEDIATELY set gun/turret drive switch to MANUAL position and vehicle master power switch to OFF position. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.

WARNING**(M1A2)**

If a fire control malfunction is indicated on the commander's integrated display (CID), commander's independent thermal viewer (CITV), gunner's control and display panel (GCDP) or in the gunner's primary sight (GPS), IMMEDIATELY set gun/turret drive switch to MANUAL position and vehicle master power switch to OFF position. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.

WARNING**(M2/M3)**

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

TRAINING DOCUMENT
TD 17-6920-711-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 20 September 1998

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OR

PRECISION GUNNERY SYSTEM (PGS)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) direct to: Simulation, Training, and Instrumentation Command, ATTN: AMSTI-LDM, 12350 Research Parkway, Orlando, FL 32826-3276. A reply will be furnished to you.

TABLE OF CONTENTS

	Page Number
How to Use This Training Document.	ii
CHAPTER 1 INTRODUCTION.	1-1
CHAPTER 2 INSTALLATION INSTRUCTIONS.	2-1
CHAPTER 3 MAINTENANCE INSTRUCTIONS	3-1
APPENDIX A REFERENCES	A-1
INDEX	Index 1

HOW TO USE THIS TRAINING DOCUMENT

This training document is designed to aid in interfacing the Thru-Sight Video (TSV) System for use on the M1/M1A1 and M1A2 tanks, in conjunction with the Tank Weapon Gunnery Simulation System (TWGSS) and the M2/M3 infantry fighting vehicles, in conjunction with the Precision Gunnery System (PGS).

FEATURES OF THIS TRAINING DOCUMENT:

- A table of contents is provided at the beginning of chapters and sections.
- WARNINGS, CAUTIONS, and NOTES, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

WARNING

A WARNING indicates a hazard which can result in death or serious injury.

CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may result in damage to equipment.

NOTE

A NOTE is a statement containing information that will make the procedures easier to perform.

- An alphabetized list of abbreviations and their meaning are included in Chapter 1 for reference purposes.
- Statements and words of particular importance are printed in CAPITAL LETTERS to create emphasis.
- An alphabetical index is provided at the end of the manual to assist in locating information not readily found in the table of contents.

FOLLOW THESE GUIDELINES WHEN YOU USE THIS TRAINING DOCUMENT:

- Read through this document and become familiar with its contents before proceeding to connect a system or perform maintenance procedures.
- A WARNING SUMMARY is provided at the beginning of this manual and should be read before performing any tasks.
- In the actual conversion of a system or during maintenance follow all WARNINGS, CAUTIONS, and NOTES. These are given immediately preceding the procedural steps to which they apply. If these instructions are not followed or care is not taken, injury to personnel or damage to equipment may result.
- Within a chapter, section, or paragraph, headings are used to help group the material and assist you in quickly finding tasks. Read all preliminary information found at the beginning of each task. After completing a task, ALWAYS perform the follow-on maintenance at the end of the task.

CHAPTER 1

INTRODUCTION

Paragraph Number	Paragraph Title	Page Number
1-1.	General	1-1
1-2.	Maintenance Forms and Procedures	1-1
1-3.	Reporting Equipment Improvement Recommendations (EIRs)	1-1
1-4.	List of Abbreviations	1-1
1-5.	Equipment Description	1-2
1-6.	Material Used in Conjunction with Major Item	1-3
1-7.	Cables and Cable Connections	1-3

1-1. GENERAL.

This training document provides the information necessary for connecting a Thru-Sight Video System (TSV) with a Tank Weapon Gunnery Simulation System (TWGSS) or Precision Gunnery System (PGS). It describes in detail the steps to install, align, operate and remove components interfacing a TSV system with either a TWGSS or PGS equipped vehicle.

1-2. MAINTENANCE FORMS AND PROCEDURES.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, *Functional Users Manual for the Army Maintenance Management System (TAMMS)* as contained in the Maintenance Management Update.

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your equipment needs improvement, let us know. Send us an EIR. You, the user are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF Form 368 (*Product Quality Deficiency Report*). Mail it to us at Simulation, Training, and Instrumentation Command. ATTN: AMSTI-LDT, 12350 Research Parkway, Orlando, FL. 32826-3276. We will send you a reply.

1-4. LIST OF ABBREVIATIONS.

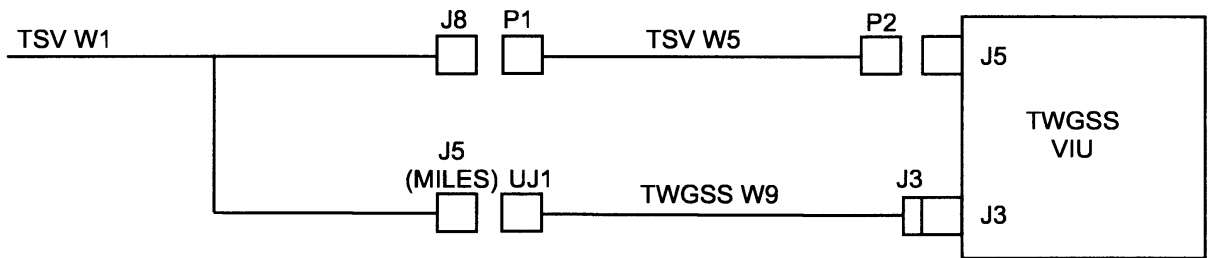
BFV	Bradley Fighting Vehicle
CGUN	Control Gun
CP	Control Panel
DTP	Diagnostic Test Panel
EIR	Equipment Improvement Recommendation

1-4. LIST OF ABBREVIATIONS (Con't).

ISU	Integrated Sight Unit
IAW	In Accordance With
MILES	Multiple Integrated Laser Engagement System
OBM	On-Board Monitor
PGS	Precision Gunnery System
PMCS	Preventive Maintenance Checks and Services
TAMMS	The Army Maintenance Management System
TBOS	Tracer, Burst, Obscuration Simulator
TEU	Turret Electronics Unit
TNB	Turret Networks Box
TOW	Tube-Launched, Optically-Tracked, Wire-Guided
TSC	Training Support Center
TSV	Thru-Sight Video
TWGSS	Tank Weapon Gunnery Simulation System
VIU	Vehicle Interface Unit

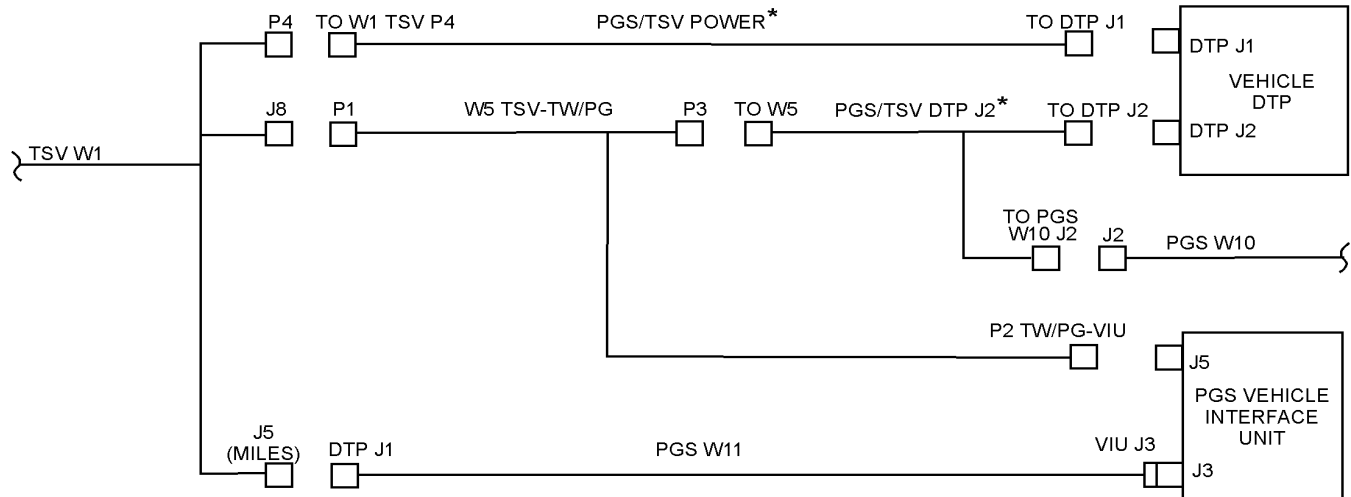
1-5. EQUIPMENT DESCRIPTION.

- a. **Purpose of TSV/TWGSS/PGS Interface.** The interface provides a means of connecting a TWGSS or PGS to a TSV system equipped vehicle resulting in video and audio recording of simulated firing of main gun and coax engagements.
- b. **Interface Configuration.** The interface consists of cables that connect either a TWGSS or PGS to a TSV system and the host vehicle.
- c. **TSV/TWGSS Interface for M1/M1A1/M1A2.**



1-5. EQUIPMENT DESCRIPTION (Con't).

d. TSV/PGS Interface for M2/M3.



* Cables furnished with TSV kit for PGS/TSV interface only.

1-6. MATERIAL USED IN CONJUNCTION WITH MAJOR ITEM.

- TWGSS.** A tank-mounted training device that aids tank crews in gaining and improving gunnery skills.
- PGS.** An infantry/cavalry Bradley Fighting Vehicle (BFV)-mounted training device that aids vehicle crews in gaining and improving gunnery skills.
- TSV.** Provides video and audio recording of gunnery engagements in real-time for simulated and live-fire exercises.
- CGUN.** Provides control of TWGSS/PGS exercises utilizing an eye-safe laser transmitter. Allows training controller to send pre-programmed messages to a TWGSS/PGS-equipped vehicle.

1-7. CABLES AND CABLE CONNECTIONS.

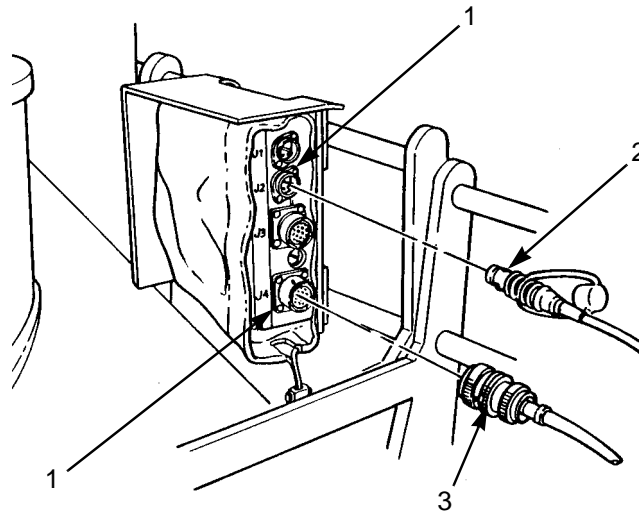
- Identification.** The interface cables are provided with identification bands in the middle identifying each cable and next to any connectors on the cable identifying the connecting point for that connector.

1-7. CABLES AND CABLE CONNECTIONS (Con't).

b. Cable Connection and Disconnection Instructions.

WARNING

- (M1/M1A1 and M1A2) DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.
- (M2/M3) DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.



- (1) Align cable connector (2 or 3) with connecting point (1) by aligning:
 - (a) either the red dot at cable connector with the red dot at connecting point, or
 - (b) by aligning the keyway at the connecting point.
- (2) For cable connectors (3) with knurled collars, rotate collar clockwise to connect. For all other cable connectors (2), push straight in to connect.

CAUTION

Any attempt to disconnect a cable by pulling only on the cable will damage the cable and cable connector.

- (3) To disconnect the knurled collar type of cable connector (3), rotate collar counterclockwise. For all other cable connectors (2), pull straight out on connector body to disconnect.

CHAPTER 2

CONNECTION INSTRUCTIONS

Paragraph Number	Paragraph Title	Page Number
2-1.	Unpacking and Packing Components	2-1
2-2.	Preliminary Inspection Instructions.	2-1
2-3.	Install TWGSS and TSV System on M1/M1A1 Tank	2-1
2-4.	Install TSV System on TWGSS-Equipped M1/M1A1 Tank.	2-5
2-5.	Install TWGSS and TSV System on M1A2 Tank	2-6
2-6.	Install TSV System on TWGSS-Equipped M1A2 Tank.	2-10
2-7.	Install PGS and TSV System on M2/M3 BFV.	2-11
2-8.	Install TSV System on PGS-Equipped M2/M3 BFV	2-18

2-1. UNPACKING AND PACKING COMPONENTS.

- a. For M1/M1A1 TWGSS, see TM 9-6920-709-12&P-1-1, Chapter 2, Section I.
- b. For M1A2 TWGSS, see TM 9-6920-709-12&P-1-2, Chapter 2, Section I.
- c. For M2/M3 PGS, see TM 9-6920-710-12&P-1, Chapter 2, Section I.
- d. For TSV system, see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.1.

2-2. PRELIMINARY INSPECTION INSTRUCTIONS.

Perform Preventive Maintenance Checks and Services (PMCS) IAW Chapter 3 of this manual.

2-3. INSTALL TWGSS AND TSV SYSTEM ON M1/M1A1 TANK.

This Task Covers:

- | | |
|-----------------|------------|
| a. Installation | c. Removal |
| b. Operation | |

Initial Setup:

Required Equipment:

- M1/M1A1 Tank
- M1/M1A1 TWGSS
- M1 Series TSV System
 - W5 TSV-TW/PG Cable

References:

- TM 9-6920-709-12&P-1-1
- TM 9-2350-255-10
- TM 9-2350-264-10
- TD 9-6920-708-10, Vol. 2 of 2

2-3. INSTALL TWGSS AND TSV SYSTEM ON M1/M1A1 TANK (Con't).

a. INSTALLATION

1. Perform TWGSS vehicle preparation procedures (see TM 9-6920-709-12&P-1-1, paragraph 2-1).
2. Perform TSV vehicle preparation procedures (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.1.2).
3. Install TSV system IAW M1/M1A1 procedures (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.2).
4. Perform TSV pre-operational setup including connecting TSV on-board monitor (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.3).
5. Place TSV power switch in OFF position (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.5).
6. Place utility power switch in OFF position (see TM 9-2350-255-10 or TM 9-2350-264-10).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

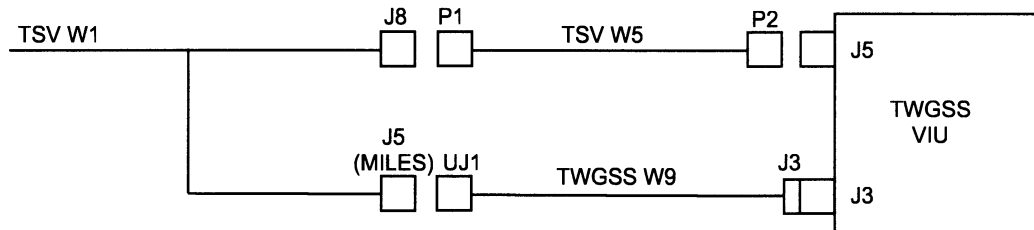
7. Turn OFF vehicle master power switch and turret power switch and place gun/turret drive switch in MANUAL position (see TM 9-2350-255-10 or TM 9-2350-264-10).
8. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-255-10 or TM 9-2350-264-10).
9. Disconnect TSV W1P4 from TNB UJ1.
10. Disconnect TSV W3M1 from TSV W1J8 (tank adapter).
11. Disconnect TSV W3P2 from TNB TEST1.
12. Disconnect TSV W3P6 from TNB TEST2.
13. Disconnect TSV W3P4 from TEU J1.
14. Disconnect vehicle cable connector TEUJ1 from TSV W3J5.
15. Connect vehicle cable connector TEUJ1 to vehicle cable receptacle TEU J1.
16. Remove and store TSV W3 cable.
17. Install M1/M1A1 TWGSS (see TM 9-6920-709-12&P-1-1, paragraphs 2-2 thru 2-6).
18. Place vehicle master power switch and turret power switch to ON (see TM 9-2350-255-10 or TM 9-2350-264-10).
19. Perform TWGSS Test Procedures (see TM 9-6920-709-12&P-1-1, paragraph 2-7).
20. Perform TWGSS Alignment Procedures (see TM 9-6920-709-12&P-1-1, paragraph 2-8).
21. Place the utility power switch in the OFF position (see TM 9-2350-255-10 or TM 9-2350-264-10).

2-3. INSTALL TWGSS AND TSV SYSTEM ON M1/M1A1 TANK (Con't).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

22. Turn OFF vehicle master power switch and turret power switch and place gun/turret drive switch in MANUAL position (see TM 9-2350-255-10 or TM 9-2350-264-10).
23. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-255-10 or TM 9-2350-264-10).
24. Connect cable TSV W5P2 to TWGSS VIU J5.
25. Connect cable TSV W5P1 to TSV W1J8.
26. Disconnect TWGSS W9UJ1 (power cable) from TNB UJ1.
27. Connect TWGSS W9UJ1 to TSV W1J5 (MILES).
28. Connect TSV W1P4 to TNB UJ1.
29. Secure all cables with velcro straps ensuring no interference with crew or vehicle operations.



WARNING

- Ensure that ALL cables between Tank Weapon Gunnery Simulation System (TWGSS) are properly connected before turning on vehicle master power switch. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.
- If a fire control malfunction is indicated on the commander's control panel or in the gunner's primary sight (GPS), IMMEDIATELY set gun/turret drive switch to MANUAL position and vehicle master power switch to OFF position. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.

30. Place the vehicle master power switch and turret power switch in the ON position (see TM 9-2350-255-10 or TM 9-2350-264-10).
31. Place turret utility power ON (see TM 9-2350-255-10 or TM 9-2350-264-10).

2-3. INSTALL TWGSS AND TSV SYSTEM ON M1/M1A1 TANK (Con't).

b. OPERATION

1. Operate TSV (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.4)
2. Operate TWGSS (see Chapter 2, Section II of TM 9-6920-709-12&P-1-1).

c. REMOVAL

1. Perform TWGSS Test Procedures (see TM 9-6920-709-12&P-1-1, paragraph 2-8).
2. Perform TSV post-operational procedures (TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.5).
3. Place the TSV power switch in the OFF position (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.6).
4. Place turret utility power OFF and main gun armed switch to SAFE (see TM 9-2350-255-10 or TM 9-2350-264-10).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

5. Place vehicle master power switch in the OFF position (see TM 9-2350-255-10 or TM 9-2350-264-10).
6. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-255-10 or TM 9-2350-264-10).
7. Disconnect TSV adapter cable W5P2 from TWGSS VIU J5.
8. Disconnect TSV adapter cable W5P1 from TSV W1J8.
9. Disconnect TWGSS W9UJ1 from TSV W1J5 (MILES).
10. Remove TWGSS (see Chapter 2, Section III of TM 9-6920-709-12&P-1-1).
11. Remove TSV system (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2-6).
12. Perform PMCS on TWGSS and TSV system IAW Chapter 3 of this document.
13. Store TWGSS (see Chapter 2, Section III of TM 9-6920-709-12&P-1-1).
14. Store TSV system (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.6).

2-4. INSTALL TSV SYSTEM ON TWGSS-EQUIPPED M1/M1A1 TANK.

This Task Covers:

Preparation of TWGSS

Initial Setup:

Required Equipment:

- M1/M1A1 Tank with TWGSS installed
- M1 Series TSV System
 - W5 TSV-TW/PG Cable

References:

- TM 9-6920-709-12&P-1-1
 - TM 9-2350-255-10
 - TM 9-2350-264-10
-

PREPARATION OF TWGSS

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

NOTE

This task prepares TWGSS and tank for TSV installation and testing.

1. Turn turret power and master power off (see TM 9-2350-255-10 or TM 9-2350-264-10).
2. Secure main gun to turret roof (see TM 9-2350-255-10 or TM 9-2350-264-10).
3. Engage turret traverse lock (see TM 9-2350-255-10 or TM 9-2350-264-10).

NOTE

DO NOT reinstall protective cover when performing step 1.

4. Perform steps 1 thru 13 and 19 thru 22, paragraph 2-23, TM 9-6920-709-12&P-1-1.
5. Coil and store TWGSS W8 and W11 cables neatly and safely inside vehicle for later installation.
6. Install TSV system IAW paragraph 2-3 of this document.

2-5. INSTALL TWGSS AND TSV SYSTEM ON M1A2 TANK.

This Task Covers:

- | | |
|-----------------|------------|
| a. Installation | c. Removal |
| b. Operation | |

Initial Setup:

Required Equipment:

- M1A2 Tank
- M1A2 TWGSS
- M1 Series TSV System
 - W5 TSV-TW/PG Cable

References:

- TM 9-6920-709-12&P-1-2
 - TM 9-2350-288-10
 - TD 9-6920-708-10, Vol. 2 of 2
-

a. INSTALLATION

1. Perform TWGSS vehicle preparation procedures (see TM 9-6920-709-12&P-1-2, paragraph 2-1).
2. Perform TSV vehicle preparation procedures (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.1.2).
3. Install TSV system IAW M1A2 procedures (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.2).
4. Perform TSV pre-operational setup including connecting TSV on-board monitor (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.3).
5. Place TSV power switch in OFF position (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.5).
6. Place utility power switch in OFF position (see TM 9-2350-288-10).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

7. Turn OFF vehicle master power switch and turret power switch and place gun/turret drive switch in MANUAL position (see TM 9-2350-288-10).
8. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-288-10).
9. Disconnect TSV W1P10 from commander's station utility panel UJ1.
10. Disconnect TSV W3P1 from TSV W1J8.
11. Disconnect TSV W4P2 from FCEU TJ2.
12. Disconnect W3P4 from TEU J1.
13. Disconnect vehicle cable connector TEUJ1 from vehicle cable receptacle TSV W3J5.
14. Connect vehicle cable connector TEUJ1 to vehicle cable receptacle TEU J1.
15. Remove and store TSV W3 cable with TSV W4 cable attached.
16. Install M1A2 TWGSS (see TM 9-6920-709-12&P-1-2, Chapter 2, paragraphs 2-2 thru 2-6).
17. Set vehicle master power and turret power to ON (see TM 9-2350-288-10).

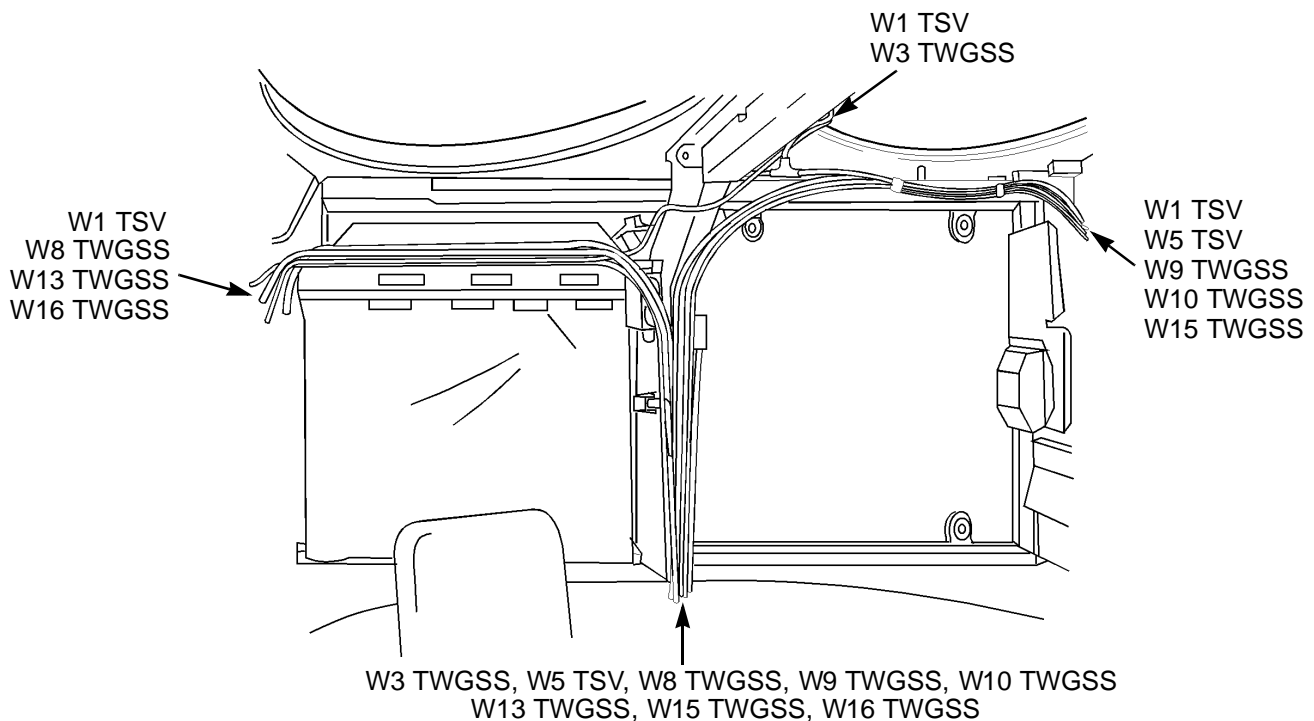
2-5. INSTALL TWGSS AND TSV SYSTEM ON M1A2 TANK (Con't).

18. Perform TWGSS Test Procedures (see TM 9-6920-709-12&P-1-2, paragraph 2-7).
19. Perform TWGSS Alignment Procedures (see TM 9-6920-709-12&P-1-2, paragraph 2-8).
20. Set utility power to OFF (see TM 9-2350-288-10).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

21. Turn OFF vehicle master power switch and turret power switch and place gun/turret drive switch in MANUAL position (see TM 9-2350-288-10).
22. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-288-10).

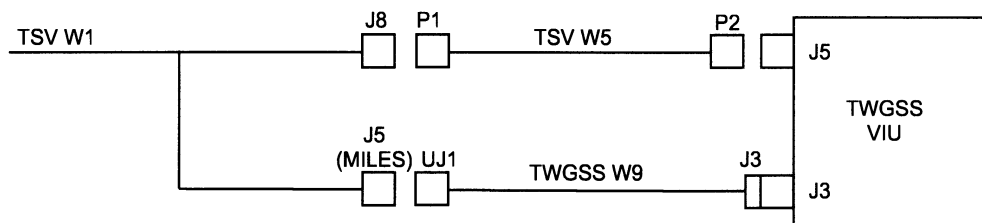


2-5. INSTALL TWGSS AND TSV SYSTEM ON M1A2 TANK (Con't).

23. Connect cable TSV W5P2 to TWGSS VIU connector J5.
24. Connect cable TSV W5P1 to TSV W1J8.
25. Disconnect TWGSS W9UJ1 from commander's station utility panel UJ1.
26. Route TWGSS W9 cable including TSV W5 cable from TWGSS VIU assembly past TWGSS loader's panel above ammo door to left side of turret wall.
27. Connect TWGSS W9UJ1 to TSV cable W1J5 (MILES).
28. Secure excess TWGSS W9 cable and TSV W5 cable to left side of turret wall.
29. Secure remainder of cables with velcro straps ensuring no interference with crew or vehicle operations.
30. Connect TSV cable W1P10 to commander's station utility panel UJ1.

WARNING

- Ensure that **ALL** cables between Tank Weapon Gunnery Simulation System (TWGSS) are properly connected before turning on vehicle master power switch. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.
 - If a fire control malfunction is indicated on the commander's integrated display (CID), commander's independent thermal viewer (CITV), gunner's control and display panel (GCDP) or in the gunner's primary sight (GPS), **IMMEDIATELY** set gun/turret drive switch to **MANUAL** position and vehicle master power switch to **OFF** position. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.
31. Set vehicle master power and turret power to ON position (see TM 9-2350-288-10).
 32. Set turret utility power ON (see TM 9-2350-288-10).



b. OPERATION

1. Operate TSV (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.4)
2. Operate TWGSS (see Chapter 2, Section II of TM 9-6920-709-12&P-1-2).

2-5. INSTALL TWGSS AND TSV SYSTEM ON M1A2 TANK (Con't).

c. REMOVAL

1. Perform TWGSS Test Procedures (see TM 9-6920-709-12&P-1-2, paragraph 2-8).
2. Perform TSV post-operational procedures (TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.5).
3. Place the TSV power switch in the OFF position (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.6).
4. Place turret utility power OFF and main gun armed switch to SAFE (see TM 9-2350-288-10).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

5. Turn OFF vehicle master power switch and turret power switch and place gun turret drive switch in MANUAL position (see TM 9-2350-288-10).
6. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-288-10).
7. Disconnect cable TSV W5P2 from TWGSS VIU J5.
8. Disconnect cable TSV W5P1 from TSV W1J8.
9. Disconnect TWGSS W9UJ1 from TSV W1J5 (MILES).
10. Remove TWGSS (see Chapter 2, Section III of TM 9-6920-709-12&P-1-2).
11. Remove TSV system (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.6).
12. Perform PMCS on TWGSS and TSV system IAW Chapter 3 of this document.
13. Store TWGSS (see Chapter 2, Section III of TM 9-6920-709-12&P-1-2).
14. Store TSV system (see TD 9-6920-708-10, Vol. 2 of 2, paragraph 2.6).

2-6. INSTALL TSV SYSTEM ON TWGSS-EQUIPPED M1A2 TANK.

This Task Covers:

Preparation of TWGSS

Initial Setup:

Required Equipment:

- M1A2 Tank with M1A2 TWGSS installed
- M1 Series TSV System
 - W5 TSV-TW/PG Cable

References:

- TM 9-6920-709-12&P-1-2
 - TM 9-2350-288-10
-

PREPARATION OF TWGSS

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position, gun/turret drive switch is in MANUAL, main gun is locked in elevation, and turret traverse lock is locked. Failure to follow this warning could result in injury or death to personnel or damage to equipment.

NOTE

This task prepares TWGSS and tank for TSV installation and testing.

1. Turn OFF vehicle master power switch and turret power switch and place gun turret drive switch in MANUAL position (see TM 9-2350-288-10).
2. Secure main gun to turret roof and engage turret traverse lock (see TM 9-2350-288-10).
3. Perform steps 1 thru 8 and 14 thru 21, paragraph 2-22.a., TM 9-6920-709-12&P-1-2.
4. Coil and store TWGSS W8, W11, and LRF Node assembly safely inside vehicle for later installation.
5. Install TSV system IAW paragraph 2-5 of this document.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV.

This Task Covers:

- | | |
|-----------------|--------------|
| a. Installation | c. Operation |
| b. Alignment | d. Removal |

Initial Setup:

Required Equipment:

- M2/M3 BFV
- M2/M3 PGS
- BFV Series TSV System
 - W5 TSV-TW/PG Cable
 - PGS/TSV DTP J2 Cable
 - PGS/TSV Power Cable

References:

- TM 9-6920-710-12&P-1
 - TM 9-2350-252-10
 - TM 9-2350-284-10
 - TD 9-6920-708-10, Vol 1 of 2
-

a. INSTALLATION

1. Perform PGS vehicle preparation procedures (see TM 9-6920-710-12&P-1, paragraph 2-1).
2. Perform TSV vehicle preparation procedures (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.1.2).
3. Install TSV system (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.2).
4. Perform TSV pre-operational setup including connecting TSV on-board monitor (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.3).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

5. Place vehicle master power switch and turret power switch to OFF position (see TM 9-2350-252-10 or TM 9-2350-284-10).
6. Disconnect TSV W1P4 from vehicle connector DTP J1.
7. Disconnect TSV W2P3 from DTPJ4
8. Disconnect TSV W2P2 from DTPJ2
9. Disconnect TSV W2P1 from TSV W1J8.
10. Remove and store TSV W2 cable safely inside vehicle.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).

CAUTION

Ensure commander's TBOS eyepiece unit is wrapped properly in a shock absorbing material. Failure to follow this caution could result in damage to equipment.

11. Install PGS (see TM 9-6920-710-12&P-1, Chapter 2, Section I, paragraphs 2-2 thru 2-6). Stow TBOS commander's eyepiece unit with W8 cable attached in forward coax ammo box next to commander or disconnect W8 cable and install TBOS backup sight eyepiece unit (TM 9-6920-710-12&P-1, paragraph 2-22.1).
12. Perform PGS Test Procedures (see TM 9-6920-710-12&P-1, paragraph 2-7).
13. Perform PGS Alignment Procedures (see TM 9-6920-710-12&P-1, paragraph 2-8) including TBOS backup sight if used (see TM 9-6920-710-12&P-1, paragraph 2-22.1).

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

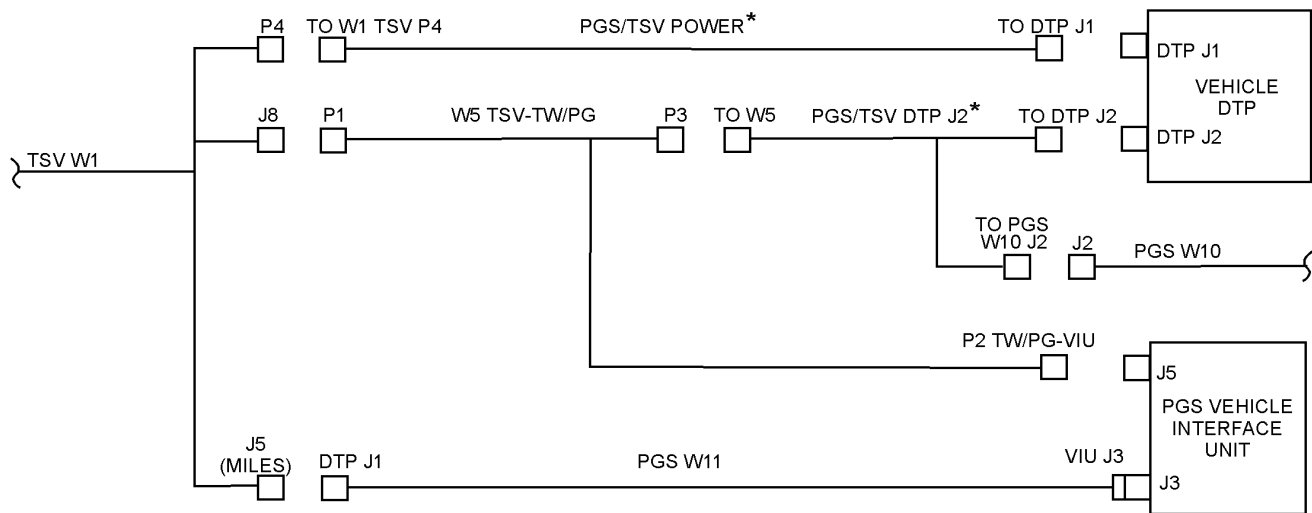
14. Place vehicle master power switch and turret power switch to OFF position (see TM 9-2350-252-10 or TM 9-2350-284-10).
15. Connect and interface PGS and TSV system IAW Table 2-1. Route TSV cables IAW TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.2.2.

Table 2-1. PGS/TSV Interface Connection Table.

Seq. #	Cable Name	Action	Connector Name	Destination
1	W5 TSV-TW/PG	Connect	W5P1	TSV W1J8
2	PGS W10	Disconnect	W10J2	Vehicle connector DTPJ2
3	PGS/TSV DTPJ2*	Connect	DTPJ2	Vehicle connector DTPJ2
4	PGS/TSV DTPJ2*	Connect	TO W10 PGS J2	PGS W10J2
5	W5 TSV-TW/PG	Connect	P2 TW/PG-VIU	PGS vehicle interface unit connector J5
6	W5 TSV-TW/PG	Connect	P3 PGS-W10	Cable PGS/TSV DTPJ2, connector: TO W5 TSV P3
7	PGS W11	Disconnect	DTPJ1	Vehicle connector DTPJ1
8	PGS/TSV Power Cable*	Connect	TO W1 TSV P4	TSV W1P4
9	PGS/TSV Power Cable*	Connect	DTPJ1	Vehicle connector DTPJ1
10	PGS W11	Connect	DTPJ1	TSV W1J5 (MILES)

* Cables furnished with TSV kit for PGS/TSV interface only.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).



* Cables furnished with TSV kit for PGS/TSV interface only.

CAUTION

Route cables carefully. Ensure cables are clear of turret ring, sharp edges, unnatural bends, weight of components, and step and walk areas under and around PGS vehicle interface assembly.

16. Coil excess cable and secure with velcro straps.
17. Place excess cable under gunner's seat ensuring seat has full up/down travel without interference with cables. Secure cable bundle to vehicle with velcro strap.
18. Install floor plate (see TM 9-6920-710-12&P-1, paragraph 2-6).
19. Place vehicle master power switch and turret power switch in the ON position. (see TM 9-2350-252-10-1 or TM 9-2350-284-10-1).
20. Power up TSV system (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.4, step 1). Ensure PGS powers up without any error messages.

b. ALIGNMENT

1. **TOW Alignment.**

NOTE

Alignment of TOW will be performed using TSV on-board monitor (OBM) and TSV keyboard.

- a. Select TOW on TOW Control Box (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).
- b. Press the ENTER key the required number of times to move the cursor to the M2/M3 field at the bottom left of the screen
- c. Press the F2 key and watch the display for a white dot at the center.
- d. Using the UP and DOWN arrow keys and the FF>> and REW<< keys, move the white dot to the center of the TOW cross hairs. Press ENTER, then press EXIT.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).

2. Gun/COAX Alignment.

NOTE

- The remaining alignment will complete the pre-operational setup of PGS/TSV interface.
- The TSV/PGS alignment steps will be performed using the PGS control panel and TSV On-Board Monitor (OBM).
- PGS Control Panel selection TV is used only in conjunction with TSV.
- The TSV/PGS conversion requires the following additional alignment procedures to align the two systems.

- a. Select AG and press ENTER.

SI	LA	TG	TC	TV			
AT							
AG							
SU							
TE							
CF	ALIGNMENT GUN						

NOTE

When AG is selected and ENTER is pressed to select an alignment submenu, the following pop-up screens appear. Ensure that the information on the pop-up screen matches vehicle setup prior to aligning system. Press ENTER to continue after each setting.

- b. Place turret drive switch in POWER MODE (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

SELECT:
1. POWER MODE
2. HIGH MAG.
PRESS ENTER

- c. Select high magnification on ISU (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

- d. Press ENTER.

- e. Set ISU range knob to 0 meters (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

- f. Press ENTER to continue.

SET RANGE
KNOB TO 0

PRESS ENTER

- g. Select HE SS on weapon control box (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

- h. Press ENTER to continue.

SELECT HE SS

PRESS ENTER

- i. Select a target that provides a clear reticle picture.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).

- j. Select TV and press ENTER.
k. Select R and press ENTER.

SI	TV					AL	R
AT							
AG							
SU							
TE							
CF	RESET						

NOTE

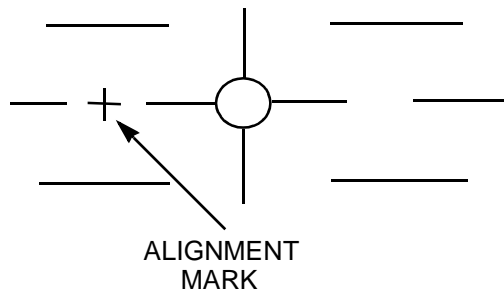
- The alignment mark presented on OBM screen is in a defaulted position and must be aligned to the correct position within the 25mm/coax reticle.
- Adjust reticle brightness and background contrast to allow for better observation of alignment mark.
- When alignment is selected, alignment steps are displayed on control panel.

- l. Select AL and press ENTER.

NOTE

If during alignment, alignment mark disappears, press ESC on CP then repeat steps k and l.

- m. Using up/down arrows buttons, adjust position of alignment mark until level with 25 mm/coax reticle aiming point.
n. Press ENTER to save and continue alignment.



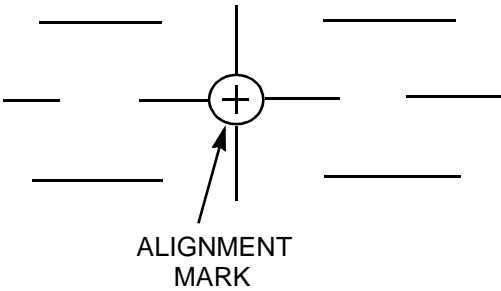
SI	TV					AL	R
AT	ADJUST MARK UNTIL LEVEL WITH AIMING POINT USING ↑ ↓ ENTER TO CONTINUE						
AG							
SU							
TE							
CF	ELEVATION						

NOTE

If during alignment, alignment mark disappears, press ESC on CP then repeat steps k and l.

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).

o. Using left/right arrow buttons, adjust alignment mark onto aiming point.



SI	TV					AL	R
AT	ADJUST MARK ONTO						
AG	AIMING POINT						
SU	USING ← →						
TE	ENTER TO CONTINUE						
CF	AZIMUTH						

p. Press ENTER to save.

NOTE

After ENTER is pressed, if the alignment mark is not properly aligned repeat steps b through p.

q. Press ESC.

c. OPERATION

1. Operate TSV (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.4).
2. Operate PGS (see TM 9-6920-710-12&P-1, Chapter 2, Section II).

d. REMOVAL

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

1. Perform PGS Test Procedures (see TM 9-6920-710-12&P-1, paragraph 2-7).
2. Perform TSV post-operational procedures (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.5)
3. Place vehicle master power switch to OFF position (see TM 9-2350-252-10 or TM 9-2350-284-10).
4. Disconnect W5 TSV-TW/PG cable connector W5P1 from TSV W1J8.
5. Disconnect PGS/TSV DTP J2 connector DTP J2 from vehicle connector DTP J2.
6. Disconnect PGS/TSV DTP J2 connector TO W10 PGS J2 from PGS W10J2.
7. Disconnect W5 TSV-TW/PG cable connector P3 from TSV/PGS DTP J2 connector TO W5 TSV P3.
8. Disconnect PGS/TSV power cable connector TO W1 TSV P4 from TSV W1P4.
9. Disconnect PGS/TSV power cable connector DTP J1 from vehicle connector DTP J1.
10. Disconnect PGS W11 connector DTP J1 from TSV W1J5(MILES).
11. Disconnect W5 TSV-TW/PG cable connector P2 TW/PG-VIU from PGS VIU connector J5.
12. Remove PGS (see TM 9-6920-710-12&P-1, Chapter 2, Section III).

2-7. INSTALL PGS AND TSV SYSTEM ON M2/M3 BFV (Con't).

13. Remove TSV system (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.5.1)
14. Perform PMCS on PGS and TSV system IAW Chapter 3 of this document.
15. Store PGS (see TM 9-6920-710-12&P-1, Chapter 2, Section III).
16. Store TSV system (see TD 9-6920-708-10, Vol. 1 of 2, paragraph 2.5.1).

2-8. INSTALL TSV SYSTEM ON PGS-EQUIPPED M2/M3 BFV.

This Task Covers:

Preparation of PGS

Initial Setup:

Required Equipment:

- M2/M3 BFV with M2/M3 PGS installed
- BFV Series TSV System
 - W5 TSV-TW/PG Cable
 - PGS/TSV DTP J2 Cable
 - PGS/TSV Power Cable

References:

- TM 9-6920-710-12&P-1
 - TM 9-2350-252-10
 - TM 9-2350-284-10
-

PREPARATION OF PGS

WARNING

DO NOT connect or disconnect cables unless vehicle master power and turret power switches are in OFF position and turret traverse lock is locked. Failure to follow this warning could cause injury or death to personnel or damage to equipment.

1. Place vehicle master power and turret power to OFF position (see TM 9-2350-252-10 or TM 9-2350-284-10).
2. Engage turret traverse lock (see TM 9-2350-252-10 or TM 9-2350-284-10).
3. Remove TBOS commander's eyepiece unit (see TM 9-6920-710-12&P-1, paragraph 2-24.c. steps 1 and 2).

CAUTION

Ensure commander's eyepiece unit is wrapped properly in a shock absorbing material. Failure to follow this caution could result in damage to equipment.

4. Stow eyepiece unit with W8 cable attached in forward coax ammo box next to commander or disconnect W8 cable and install TBOS backup sight eyepiece unit (see TM 9-6920-710-12&P-1, paragraph 2-22.1).
5. Remove floor plate (see TM 9-6920-710-12&P, paragraph 2-23.g.).
6. Disconnect W11 cable (see TM 9-6920-710-12&P-1, paragraph 2-23.i. steps 1 and 2).
7. Disconnect W9 cable connector DTPJ4 and DTPJ3 from vehicle DTP connectors (see TM 9-6920-710-12&P-1, paragraph 2-23.j. steps 1 thru 4).
8. Disconnect W10 connector DTPJ2 from vehicle DTP connector (see TM 9-6920-710-12&P-1, paragraph 2-23.k. step 3).
9. Leave cables disconnected for later installation.
10. Install TSV system IAW paragraph 2-7 of this document.

CHAPTER 3 OPERATOR/CREW MAINTENANCE INSTRUCTIONS

Section I. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Paragraph Number	Paragraph Title	Page Number
3-1.	General.	3-1
3-2.	Maintenance Procedures	3-1
3-3.	Maintenance Allocation Chart.	3-1
3-4.	Preventive Maintenance Checks and Services	3-1

3-1. GENERAL.

To ensure that TSV/TWGSS/PGS connection cables are ready for operation at all times, they must be inspected on a scheduled basis and maintained IAW the referenced technical manuals so that defects may be found and corrected before they result in serious damage, equipment failure or injury to personnel.

3-2. MAINTENANCE PROCEDURES.

Refer to the following manuals for required maintenance instructions and troubleshooting procedures for:

- a. M1/M1A1 TWGSS, TM 9-6920-709-12&P-1-1
- b. M1A2 TWGSS, TM 9-6920-709-12&P-1-2
- c. M2/M3 PGS, TM 9-6920-710-12&P-1
- d. M2/M3 TSV, TD 9-6920-708-10, Vol. 1 of 2
- e. M1 TSV, TD 9-6920-708-10, Vol. 2 of 2

3-3. MAINTENANCE ALLOCATION CHART (MAC).

Refer to the following manuals for allocation of maintenance levels and tool and test equipment requirements for:

- a. M1/M1A1 TWGSS, TM 9-6920-709-12&P-1-1
- b. M1A2 TWGSS, TM 9-6920-709-12&P-1-2
- c. M2/M3 PGS, TM 9-6920-710-12&P-1

3-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

Refer to the following manuals for preventive maintenance checks and services for:

- a. M1/M1A1 TWGSS, TM 9-6920-709-12&P-1-1
- b. M1A2 TWGSS, TM 9-6920-709-12&P-1-2
- c. M2/M3 PGS, TM 9-6920-710-12&P-1
- d. M2/M3 TSV, TD 9-6920-708-10, Vol. 1 of 2
- e. M1 TSV, TD 9-6920-708-10, Vol. 2 of 2

Section II. OPERATOR/CREW TROUBLESHOOTING PROCEDURES

Paragraph Number	Paragraph Title	Page Number
3-5.	General	3-3
3-6.	Explanation of Columns	3-3
3-7.	Troubleshooting Symptom Index	3-4
Table 3-1.	Operator/Crew Troubleshooting	3-5

3-5. GENERAL.

a. This section provides information for identifying and correcting malfunctions which may develop when operating the M1 Series Tank in conjunction with TWGSS and TSV and M2/M3 Series BFV in conjunction with PGS and TSV.

b. The Troubleshooting Symptom Index (see paragraph 3-7) lists common malfunctions which may occur and refers you to the proper page in Table 3-1 for a troubleshooting procedure.

c. This section cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify trained TWGSS/PGS/TSV troubleshooter or Training Support Center (TSC).

d. When troubleshooting a malfunction:

(1) Locate the symptom or symptoms in paragraph 3-7 that best describe the malfunction. If the appropriate symptom is not listed, notify a trained TWGSS/PGS/TSV troubleshooter or TSC.

(2) Turn to page in Table 3-1 where the troubleshooting procedures for the malfunction in question are described. Headings at the top of each page show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION (in step number order), and CORRECTIVE ACTION.

(3) Perform each step in the order listed until the malfunction is corrected.

3-6. EXPLANATION OF COLUMNS.

a. **MALFUNCTION**. A visual or operational indication that something is wrong with TWGSS, PGS, or TSV.

b. **TEST OR INSPECTION**. A procedure to isolate the problem in a system or component.

c. **CORRECTIVE ACTION**. A procedure to correct the problem.

3-7. TROUBLESHOOTING SYMPTOM INDEX.

	Troubleshooting Procedure Page
M1 Series Tank TWGSS/TSV Symptom (Malfunction)	
TWGSS will not power up but TSV will power up	3-5
TSV will not power up but TWGSS will power up	3-5
Weapon system data not recorded or displayed by TSV system	3-5
Any other failures.	3-5
M2/M3 Series BFV/PGS/TSV Symptom (Malfunction)	
PGS will not power up but TSV will power up	3-6
TSV will not power up but PGS will power up	3-6
Weapon system data not recorded or displayed by TSV system	3-6
Any other failures.	3-7

Table 3-1. Operator/Crew Troubleshooting.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<hr/>		
1.	TWGSS WILL NOT POWER UP BUT TSV SYSTEM WILL POWER UP.	
	Step 1.	Check TWGSS W9 cable for loose or disconnected cable connections. Connect TWGSS W9 cable properly (see paragraph 2-3 or 2-5).
	Step 2.	Check TWGSS W9 cable for damage. If TWGSS W9 cable is damaged, notify trained TWGSS troubleshooter or TSC.
	Step 3.	Check TSV W1 cable for loose or disconnected cable connections. Connect TSV W1 cable properly (see paragraph 2-3 or 2-5).
	Step 4.	Check TSV W1 cable for damage. If TSV W1 cable is damaged, notify trained TWGSS troubleshooter or TSC.
	Step 5.	Refer to TWGSS TM 9-6920-709-12&P-1-1 (M1/M1A1) or TM 9-6920-709-12&P-1-2 (M1A2) troubleshooting.
2.	TSV SYSTEM WILL NOT POWER UP BUT TWGSS WILL POWER UP.	
	Refer to TSV TD 9-6920-708-10, Vol. 2 of 2 troubleshooting.	
3.	WEAPON SYSTEM DATA NOT RECORDED OR DISPLAYED BY TSV SYSTEM.	
	Step 1.	Check TSV W5 cable for loose or disconnected cable connections. Connect TSV W5 cable properly (see paragraph 2-3 or 2-5).
	Step 2.	Check TSV W5 cable for damage. If TSV W5 cable is damaged, notify trained TSV troubleshooter or TSC.
	Step 3.	Check TSV W1 cable for loose or disconnected cable connectors. Connect TSV W1 cable properly (see paragraph 2-3 or 2-5).
	Step 4.	Check TSV W1 cable for damage. If TSV W1 cable is damaged, notify trained TWGSS troubleshooter or TSC.
	Step 5.	Check TWGSS vehicle interface unit for damage. If TWGSS vehicle interface unit is damaged, notify trained TWGSS troubleshooter or TSC.
	Step 6.	Refer to TSV TD 9-6920-708-10, Vol. 2 of 2 troubleshooting or TWGSS TM 9-6920-709-12&P-1-1 (M1/M1A1) or TM 9-6920-109-12&P-1-2 (M1A2) troubleshooting.
4.	ANY OTHER FAILURES.	
	Refer to TWGSS TM 9-6920-709-12&P-1-1 (M1/M1A1) or TM 9-6920-709-12&P-1-2 (M1A2) trouble-shooting or to TSV TD 9-6920-708-10, Vol. 2 of 2 troubleshooting.	

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
5. PGS WILL NOT POWER UP BUT TSV SYSTEM WILL POWER UP.		
Step 1.	Check PGS W11 DTPJ1 connector for loose or disconnected cable connection at TSV W1J5 (MILES) connector.	Connect PGS W11 cable properly (see paragraph 2-7).
Step 2.	Check PGS W11 cable for damage.	If PGS W11 cable is damaged, notify trained PGS troubleshooter or TSC.
Step 3.	Check TSV W1 cable for loose or disconnected cable connections.	Connect TSV W1 cable properly (see paragraph 2-7).
Step 4.	Check TSV W1 cable for damage.	If TSV W1 cable is damaged, notify trained TSV troubleshooter or TSC.
Step 5.	Refer to PGS TM 9-6920-710-12&P-1 troubleshooting.	
6. TSV SYSTEM WILL NOT POWER UP BUT PGS WILL POWER UP.		
Step 1.	Check PGS/TSV power cable for loose or disconnected cable connections.	Connect PGS/TSV power cable properly (see paragraph 2-7).
Step 2.	Check PGS/TSV power cable for damage.	If PGS/TSV power cable is damaged, notify trained TSV troubleshooter or TSC.
Step 3.	Refer to TSV TD 9-6920-708-10, Vol. 1 of 2 troubleshooting.	
7. WEAPON SYSTEM DATA NOT RECORDED OR DISPLAYED BY TSV SYSTEM.		
Step 1.	Check TSV W5 cable for loose or disconnected cable connections.	Connect TSV W5 cable properly (see paragraph 2-7).
Step 2.	Check TSV W5 cable for damage.	If TSV W5 cable is damaged, notify trained TSV troubleshooter or TSC.
Step 3.	Check PGS/TSV DTP J2 cable for loose or disconnected cable connectors.	Connect PGS/TSV DTP J2 cable properly (see paragraph 2-7).
Step 4.	Check PGS/TSV DTP J2 cable for damage.	If PGS/TSV DTP J2 cable is damaged, notify trained TWGSS troubleshooter or TSC.
Step 5.	Check PGS vehicle interface unit for damage.	If PGS vehicle interface unit is damaged, notify trained TWGSS troubleshooter or TSC.
Step 6.	Refer to TSV TD 9-6920-708-10, Vol. 1 of 2 troubleshooting.	

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. ANY OTHER FAILURES.

Refer to PGS TM 9-6920-710-12&P-1 troubleshooting or to TSV TD 9-6920-708-10, Vol. 1 of 2 troubleshooting.

APPENDIX A REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and other publications referenced in this manual and those that apply to the TSV/TWGSS/PGS connection instructions.

A-2. PUBLICATION INDEX.

DA Pam 25-30, *Consolidated Index of Army Publications and Blank Forms*, should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this training document.

A-3. FORMS.

Refer to DA Pam 738-750, *Functional Users Manual for the Army Maintenance Management System (TAMMS)*, for instructions on use of maintenance forms.

Equipment Inspection and Maintenance Worksheet	DA Form 2404
Maintenance Request.	DA Form 2407
Preventive Maintenance Schedule and Record	DD Form 314
Product Quality Deficiency Report	SF Form 368
Recommended Change to Publications and Blank Forms.	DA Form 2028

A-4. TECHNICAL MANUALS.

Operator's and Unit Maintenance Manual (Including Repair Parts and Special Tools Lists) for Tank Weapon Gunnery Simulation System (TWGSS).	TM 9-6920-709-12&P-1-1 & -2
Operator's and Unit Maintenance Manual (Including Repair Parts and Special Tools Lists) for Precision Gunnery System (PGS).	TM 9-6920-710-12&P-1
Operator's Manual for Fighting Vehicle: Infantry M2, M2A1 and Fighting Vehicle, Cavalry M3, M3A1	TM 9-2350-252-10
Operator's Manual for Fighting Vehicle: Infantry M2, M2A2 and Fighting Vehicle, Cavalry M3, M3A2	TM 9-2350-284-10
Operator's Manual for Tank Combat, Full Tracked: 105-mm Gun, M1	TM 9-2350-255-10
Operator's Manual for Tank Combat, Full Tracked: 120-mm Gun, M1A1	TM 9-2350-264-10
Operator's Manual for Tank Combat, Full Tracked: 120-mm Gun, M1A2	TM 9-2350-288-10
Operator's Manual for Thru-Sight Video System for M2/M3, Volume 1 of 2	TD 9-6920-708-10
Operator's Manual for Thru-Sight Video System for M1, Volume 2 of 2	TD 9-6920-708-10

INDEX

<i>Paragraph Title</i>	<i>Paragraph</i>	<i>Page</i>
A		
Abbreviations, List of	1-4	1-1
C		
Cables and Cable Connections	1-7	1-3
E		
Equipment Description	1-5	1-2
Explanation of Columns	3-6	3-3
I		
Install PGS and TSV System to M2/M3 BFV	2-7	2-11
Install TSV System on PGS-Equipped M2/M3 BFV	2-8	2-17
Install TSV System on TWGSS-Equipped M1/M1A1 Tank	2-4	2-5
Install TSV System on TWGSS-Equipped M1A2 Tank	2-6	2-10
Install TWGSS and TSV System on M1/M1A1 Tank	2-3	2-1
Install TWGSS and TSV System on M1A2 Tank	2-5	2-6
L		
List of Abbreviations	1-4	1-1
M		
Maintenance Allocation Chart	3-3	3-1
Maintenance Forms and Procedures	1-2	1-1
Maintenance Procedures	3-2	3-1
Material Used in Conjunction with Major Item	1-6	1-3
O		
Operator/Crew Troubleshooting	Table 3-1	3-5
P		
Preliminary Inspection Instructions	2-2	2-1
Preventive Maintenance Checks and Services (PMCS)	3-4	3-1
R		
Reporting Equipment Improvement Recommendations (EIRs)	1-3	1-1

INDEX (Con't)

<i>Paragraph Title</i>	<i>Paragraph</i>	<i>Page</i>
T		
Troubleshooting Symptom Index	3-7	3-4
U		
Unpacking and Packing Components	2-1	2-1